UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
STANDARD ANNULAR PRESSURE TEST

Operator Environmental Geotechnologies
Address 12160 Beaubien Street
Detroit Michigan 48226
Well Name Well 1-12 (Test 1)

State Permit No. MI5M453
USEPA Permit No. MI-163-1W-C011
Date of Test 6/26/13
Well Type Class I-Hazardous Comm.

LOCATION INFORMATION _____ Quarter of the _____ Quarter of the _____ Quarter of Section 12 ; Range 9e ; Township 35 ; County Wayne ;
Company Representative R. Schildhouse ; Field Inspector J. Wawczak ;
Type of Pressure Gauge _____ inch face; _____ psi full scale; _____ psi increments;

New Gauge? Yes ☐ No ☑ If no, date of calibration _____ Calibration certification submitted? Yes ☑ No ☐

TEST RESULTS	
Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells. For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure. Original chart recordings must be submitted with this form.	5-year or annual test on time? Yes ☐ No ☐ 2-year test for TA'd wells on time? Yes ☐ No ☐ After rework? Yes ☐ No ☐ Newly permitted well? Yes ☑ No ☐

Time	Pressure (in psig) Annulus	Tubing
9:20	917	1
9:30	916	1
9:40	916	2
9:50	916	2
10:00	915	2
10:10	915	2
10:20	916	3

Casing size 7" (Steel)
Tubing size 4.5 (Fiberglass)
Packer type _____
Packer set @ _____
Top of Permitted Injection Zone 3937
Is packer 100 ft or less above top of Injection Zone ? Yes ☐ No ☐
If not, please submit a justification.
Fluid return (gal.) _____
Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 28 psi
Test Period Pressure change 1 psi

Test Passed ☑ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

Printed Name of Company Representative _____ Signature of Company Representative _____ Date _____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
STANDARD ANNULAR PRESSURE TEST

Operator Environmental Geo-Technologies
Address 12160 Beaubien Street
Detroit Michigan 48226
Well Name Well 1-12 (Test 2)

State Permit No. MIS M453
USEPA Permit No. MI-163-IW-C011
Date of Test 6/26/13
Well Type Class I - Hazardous Comm.

LOCATION INFORMATION ____ Quarter of the ____ Quarter of the ____ Quarter of Section 12; Range 9e; Township 3S; County Wayne;
Company Representative R. Schildhouse; Field Inspector J. Wawczak;
Type of Pressure Gauge ____ inch face; ____ psi full scale; ____ psi increments;

New Gauge? Yes ☐ No ☒ If no, date of calibration ____ Calibration certification submitted? Yes ☒ No ☐

TEST RESULTS	
Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells. For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure. Original chart recordings must be submitted with this form.	5-year or annual test on time? Yes ☐ No ☐ 2-year test for TA'd wells on time? Yes ☐ No ☐ After rework? Yes ☐ No ☐ Newly permitted well? Yes ☒ No ☐

Pressure (in psig)

Time	Annulus	Tubing
10:25	1075	3
10:35	1073	3
10:45	1069	3
10:55	1069	3
11:05	1069	3
11:15	1070	3
11:25	1069	2

Casing size 7" (steel)
Tubing size 4.5" (Fiber Glass)
Packer type ____
Packer set @ ____
Top of Permitted Injection Zone 3937
Is packer 100 ft or less above top of Injection Zone ? Yes ☐ No ☐
If not, please submit a justification.
Fluid return (gal.) ____
Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 32.2 psi
Test Period Pressure change 0 psi

Test Passed ☒ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

Printed Name of Company Representative | Signature of Company Representative | Date

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
STANDARD ANNULAR PRESSURE TEST

Operator Environmental Geo-Technologies
Address 12160 Beaubien St.
Detroit Michigan 48226
Well Name Well 2-12 (Test 2)

State Permit No. MISMH52
USEPA Permit No. MI-163-1W-C010
Date of Test 6/26/2013
Well Type Class I - Hazardous Comm

LOCATION INFORMATION _____ Quarter of the _____ Quarter of the _____ Quarter of Section 12; Range 9e; Township 3S; County Wayne;
Company Representative R. Schildhouse; Field Inspector S. Wawczak;
Type of Pressure Gauge _____ inch face; _____ psi full scale; _____ psi increments;

New Gauge? Yes ☐ No ☑ If no, date of calibration _____ Calibration certification submitted? Yes ☑ No ☐

TEST RESULTS	
Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells. For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure. Original chart recordings must be submitted with this form.	5-year or annual test on time? Yes ☐ No ☐ 2-year test for TA'd wells on time? Yes ☐ No ☐ After rework? Yes ☐ No ☐ Newly permitted well? Yes ☑ No ☐

Time	Pressure (in psig) Annulus	Tubing
11:40	1045	102
11:50	1044	101
12:00	1043	101
12:10	1041	101
12:20	1039	101
12:30	1038	101
12:40	1039	101

Casing size 7" (Steel)
Tubing size 4.5" (FiberGlass)
Packer type _____
Packer set @ _____
Top of Permitted Injection Zone 3937
Is packer 100 ft or less above top of Injection Zone ? Yes ☐ No ☐
If not, please submit a justification.
Fluid return (gal.) _____
Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 31.3 psi
Test Period Pressure change 6 psi

Test Passed ☑ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

Printed Name of Company Representative _____ Signature of Company Representative _____ Date _____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
STANDARD ANNULAR PRESSURE TEST

Operator ENVIRONMENTAL GEO-TECHNOLOGIES
Address 12160 BEAUBIEN ST.
DETROIT MICHIGAN 48226
Well Name WELL Z-12 (TEST 1)

State Permit No. MIS M452
USEPA Permit No. MI-163-1W-C010
Date of Test 6/26/2013
Well Type CLASS 1 - HAZARDOUS CONTIN.

LOCATION INFORMATION _____ Quarter of the _____ Quarter of the _____ Quarter
of Section 12 ; Range 9E ; Township 3S ; County WAYNE ;
Company Representative R. SCHILDHAUSE ; Field Inspector J. WAWCZAK ;
Type of Pressure Gauge _____ inch face; _____ psi full scale; _____ psi increments;

New Gauge? Yes ☐ No ☑ If no, date of calibration _____ Calibration certification submitted? Yes ☑ No ☐

TEST RESULTS	
Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells. For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure. Original chart recordings must be submitted with this form.	5-year or annual test on time? Yes ☐ No ☐ 2-year test for TA'd wells on time? Yes ☐ No ☐ After rework? Yes ☐ No ☐ Newly permitted well? Yes ☑ No ☐

Pressure (in psig)

Time	Annulus	Tubing
10:30	906	101
10:40	909	101
10:50	909	101
11:00	908	101
11:10	907	101
11:20	908	101
11:30	909	101

Casing size 7" (STEEL)
Tubing size 4.5" (Fiberglass)
Packer type _____
Packer set @ _____
Top of Permitted Injection Zone 3937
Is packer 100 ft or less above top of Injection Zone ? Yes ☐ No ☐
If not, please submit a justification.
Fluid return (gal.) _____
Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 27.2 psi
Test Period Pressure change -3 psi

Test Passed ☑ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

Printed Name of Company Representative | Signature of Company Representative | Date

Version: Temperature log 2009-11-16

REVIEW OF TEMPERATURE LOGS FOR PART (2) OF MI

Facility Name		Operator	
Romulus Facility		Environmental GeoTechnologies	
Well Name	Test ID Number	US EPA Permit Number	Analyst
Well 1-12	2013-037	MI-163-1W-C010	J. Wawczak
County	State	Test Date	Analysis Date
Wayne	Michigan	June 26, 2013	July 26, 2013

Well and Operational Information

Long String Casing Length, ft	Tubing Depth, ft	Tailpipe Depth, ft	Does Injectate Temperature vary?
4080	4050	4055	No
Depth to Base of USDW, ft.	Name of Lowermost USDW	Date of Last Injection	Is this a Multi-zone Facility?
387	Dundee Limestone	December 4, 2012	No
Depth to Top of Injection Interval, ft	Name of Injection Zone	Hour of Last Injection	Other Zones Used at Facility
4045	Trempealeau, Franconia, Eau Claire, Mt. Simon	NA	NA
Top of Fill/Plugged Back Depth, ft.	Total Depth, ft	Volume Injected in PastYear, gal	Depth to Other Injection Zone, ft
4246	4645	0	NA

Calibration Information		Logging Information	
Low Gauge Temp, deg F	High Gauge Temperature, deg. F	Time of start of Logging	For Data Plot, Data Interval, ft
40.5	135.6	11:51	5
Low Thermometer Temp, deg. F	High Thermometer Temp, deg. F	Hours since injection	Max Log Depth, ft.
41	137	NA	4240
Were Log Readings Adjusted?	Overall Appearance Good?	Decay Series?	Maximum Logging Speed, ft/min
No	Yes	No	33

Observations

Depth to Liquid Level, ft	Top of Receptive Strata, ft.	Depth of Most Extreme temp above receptive strata, ft	Depth of Most Extreme temp in receptive strata, ft
140	Not Apparent	NA	4050
Temperature at Total Depth, deg F	Bottom of Receptive Strata, ft.	Most Extreme Temp above IZ, deg F	Most Extreme Temp in IZ, deg F
85.21	Not Apparent	NA	83.20
Top of Receptive Strata to top of IZ, ft	Thickness of Receptive Interval, ft		
NA	NA		

Analysis

Is a Log Available for Comparison?	Are traces Essentially Congruent?	Intervals with Constant Temp over more than 50 ft. present in cased hole?	
Yes	Yes	No	
What Well Log Used?	Is there a Pivot Point	Top of Interval #1, ft	Top of Interval #2, ft
EGT #1-12	No	NA	NA
What Year?	If yes, What depth? ft	Bottom of Interval #1, ft	Bottom of Interval #2, ft
2007	NA	NA	NA
Gauge calibration submited?	If Yes, What Temp? deg F	Is Constant Temp More or Less than Temp Above?	
Yes	NA	NA	NA
		Does this Suggest Flow?	Does this Suggest Flow?
		NA	NA

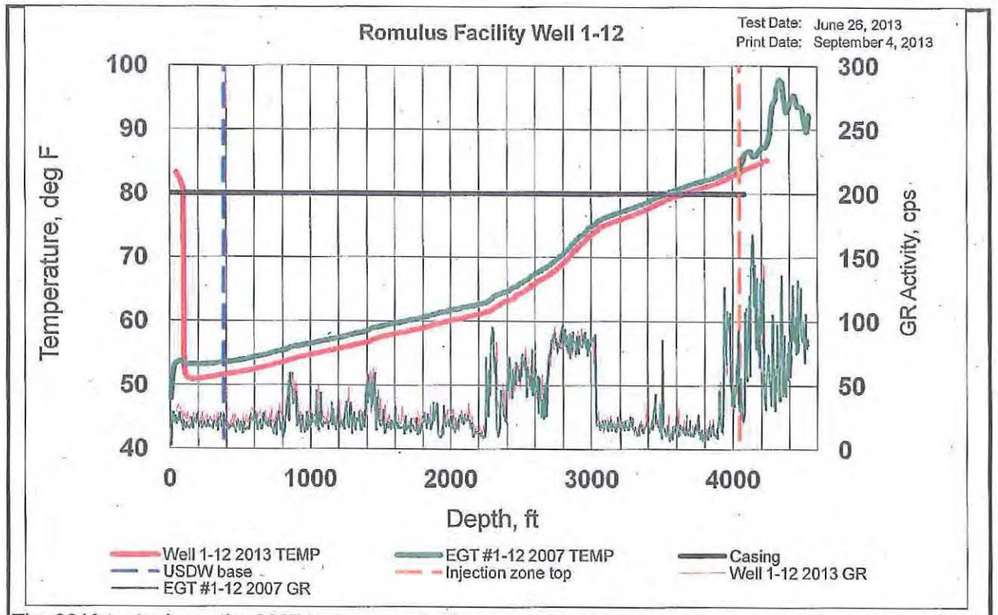
Comments

Before conducting the test, the tool was tested in hot water as well as ice water, per the submitted procedures.

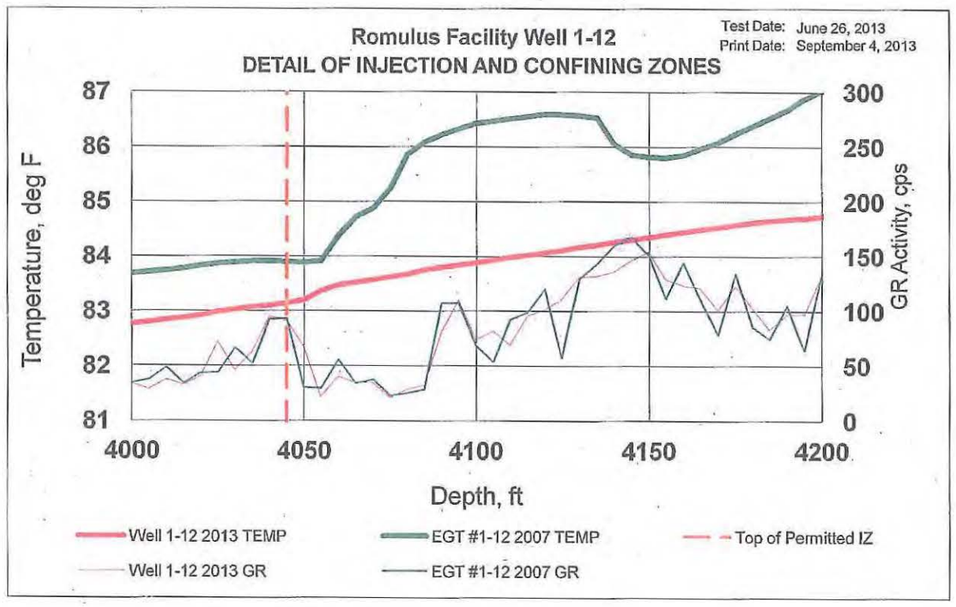
Does the Well Have External Mechanical Integrity?

Yes

Version: Temperature log 2009-11-16



The 2013 test mirrors the 2007 test very well. There appears to be a sudden drop in temperature right at the start of the test, this is most likely caused by the hight temperature outside on the testing day. The other major difference is in the injection zone. In the 2013 test the curve remains constant after entering the injection zone. For the 2007 test there was a rise in temperature after entering the injection zone.



Version: Temperature log 2009-11-16

REVIEW OF TEMPERATURE LOGS FOR PART (2) OF MI

Facility Name		Operator	
Romulus Facility		Environmental GeoTechnologies	
Well Name		USEPA Permit Number	Analyst
Well 1-12		MI-163-1W-C010	J. Wawczak
County	State	Test Date	Analysis Date
Wayne	Michigan	June 26, 2013	July 26, 2013

COMMENTS

The 2013 test mirrors the 2007 test very well. There appears to be a sudden drop in temperature near the surface, this is most likely caused by the hight temperature outside on the testing day. The other major difference is in the injection zone. In the 2013 test the gradient remains constant after entering the injection zone. For the 2007 test there was a rise in temperature after entering the injection zone. The lack of apparent injection zone in the 2013 is possibly due to the lack of injection over the past few years causing a return to geothermal temperatures.

Version: Temperature log 2009-11-16

REVIEW OF TEMPERATURE LOGS FOR PART (2) OF MI

Facility Name		Operator	
Romulus Facility		Environmental GeoTechnologies	
Well Name	**Test ID Number**	**US EPA Permit Number**	**Analyst**
Well #2-12	2013-039	MI-163-1W-C011	J. Wawczak
County	**State**	**Test Date**	**Analysis Date**
Wayne	Michigan	June 27, 2013	July 22, 2013

Well and Operational Information

Long String Casing Length, ft	Tubing Depth, ft	Tailpipe Depth, ft	Does Injectate Temperature vary?
3983	3953	NA	No
Depth to Base of USDW, ft.	**Name of Lowermost USDW**	**Date of Last Injection**	**Is this a Multi-zone Facility?**
136	Dundee Limestone	January 16, 2013	No
Depth to Top of Injection Interval, ft	**Name of Injection Zone**	**Hour of Last Injection**	**Other Zones Used at Facility**
3940	Black River, Glenwood, Trempealeau	NA	No
Top of Fill/Plugged Back Depth, ft.	**Total Depth, ft**	**Volume Injected in PastYear, gal**	**Depth to Other Injection Zone, ft**
4180	4550	0	NA

Calibration Information		Logging Information	
Low Gauge Temp, deg F	**High Gauge Temperature, deg. F**	**Time of start of Logging**	**For Data Plot, Data Interval, ft**
40.6	131.8	09:00	0.25
Low Thermometer Temp, deg. F	**High Thermometer Temp, deg. F**	**Hours since injection**	**Max Log Depth, ft.**
49	135	NA	413
Were Log Readings Adjusted?	**Overall Appearance Good?**	**Decay Series?**	**Maximum Logging Speed, ft/min**
No	Yes	0	34

Observations

Depth to Liquid Level, ft	Top of Receptive Strata, ft.	Depth of Most Extreme temp above receptive strata, ft	Depth of Most Extreme temp in receptive strata, ft
150	Not Apparent	205	4172
Temperature at Total Depth, deg F	**Bottom of Receptive Strata, ft.**	**Most Extreme Temp above IZ, deg F**	**Most Extreme Temp in IZ, deg F**
51.83	Not Apparent	51.35	51.83
Top of Receptive Strata to top of IZ, ft	**Thickness of Receptive Interval, ft**		
NA	NA		

Analysis

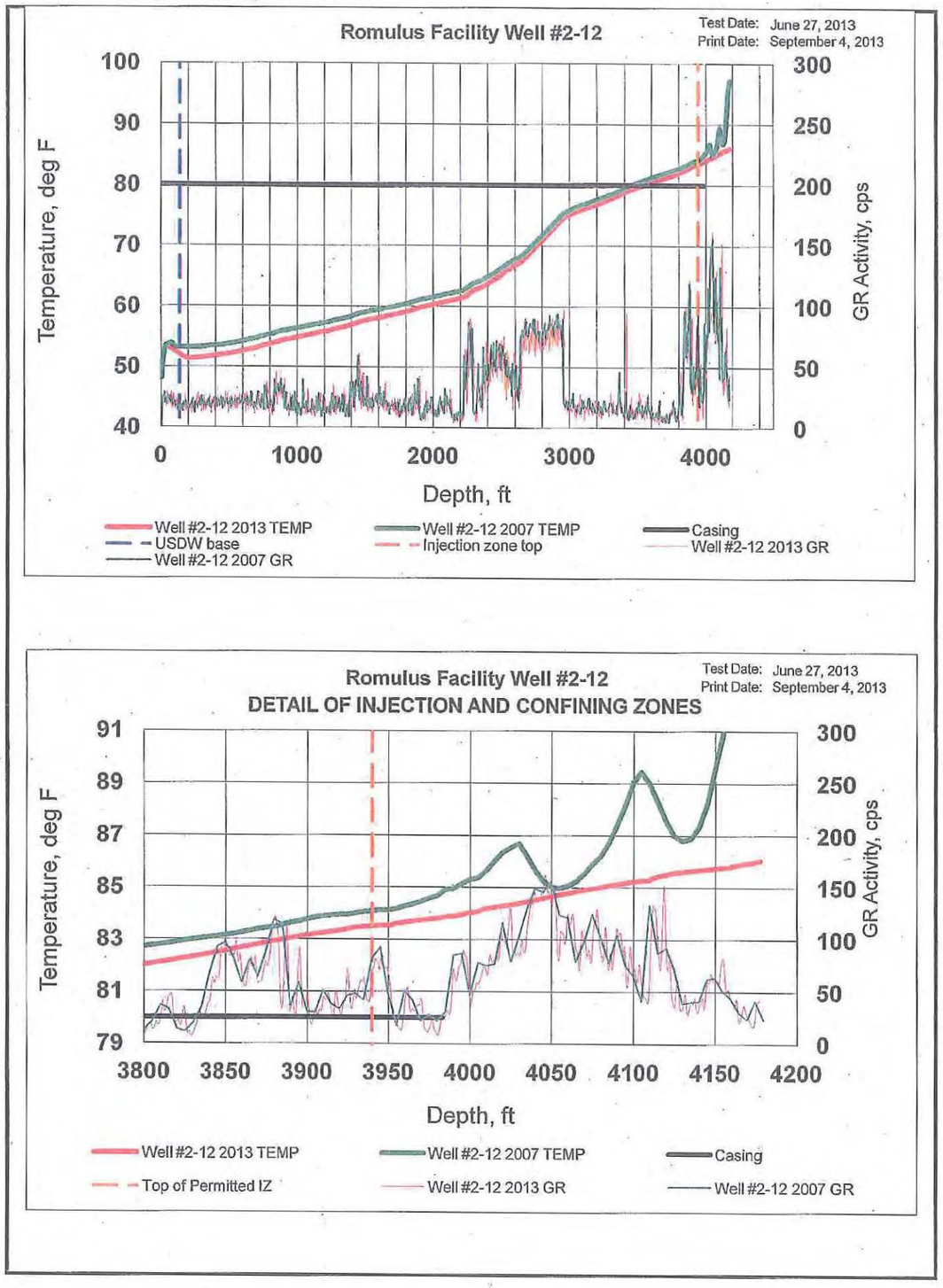
Is a Log Available for Comparison?	Are traces Essentially Congruent?	Intervals with Constant Temp over more than 50 ft. present in cased hole?	
Yes	Yes	No	
What Well Log Used?	**Is there a Pivot Point**	**Top of Interval #1, ft**	**Top of Interval #2, ft**
Well #2-12	No	NA	NA
What Year?	**If yes, What depth? ft**	**Bottom of Interval #1, ft**	**Bottom of Interval #2, ft**
2007	NA	NA	NA
	If Yes, What Temp? deg F	**Is Constant Temp More or Less than Temp Above?**	
	NA	NA	NA
		Does this Suggest Flow?	**Does this Suggest Flow?**
		NA	NA

Comments
Before conducting the test, the tool was tested in hot water as well as ice water, per the submitted procedures.

Does the Well Have External Mechanical Integrity?

Yes

Version: Temperature log 2009-11-16



Version: Temperature log 2009-11-16

REVIEW OF TEMPERATURE LOGS FOR PART (2) OF MI			
Facility Name Romulus Facility		Operator Environmental GeoTechnologies	
Well Name Well #2-12		USEPA Permit Number MI-163-1W-C011	Analyst J. Wawczak
County Wayne	State Michigan	Test Date June 27, 2013	Analysis Date July 22, 2013

COMMENTS

The 2013 test mirrors the 2007 test very well. The graphs are almost perfectly in line, all the way to the injection zone. Once in the injection zone the the 2007 graph has two small bumps where the temperature rapidly increases, for the 2013 test it stays at a steady rising slope and at around 4200 feet the temperature reading is almost 10 degrees less then in 2007. The absence in activity for the 2013 test is most likely due to the lack of injection activity in the past few years.

Version of 4/8/13

REVIEW OF RADIOACTIVE TRACER SURVEY FOR CEMENT INTEGRITY

Facility Name			Operator		
Romulus Facility			Environmental GeoTechnologies		
Well Name			USEPA Permit Number	Witness	Analyst
Well 1-12			MI-163-1W-C010	USEPA	Greenhagen
State	Test Date	Test Number	Logging Company		Analysis Date
Michigan	June 26, 2013	2013-038	Baker Hughes		July 30, 2013

Well and Operational Information

LS Csg Material	LS Casing OD, in	Casing weight, #/ft	Casing ID, in	Long String Casing Length, ft	
Steel and Hastelloy	7	26	6.28	4080	
Tubing Material	Tubing OD, in		Tubing ID, in	Tubing Length, ft	
Fiberglass	4.5		3.980	4050	
Tail Pipe Material	Tail Pipe OD, in	Tail Pipe, weight#/ft.	Tail Pipe ID, in	Tail Pipe Length, ft	Tail Pipe Depth, ft
NA	NA	NA	NA	NA	NA
	OpenHole diameter, in	TD, ft	PBTD, ft	Top of Open Interval, ft	
	8.75	4645	N/A	4080	
Packer Model		Packer Type		Top of Packer, ft	Bottom of Packer, ft
GPS				4050	4055

Geological Information

Name of Lowermost USDW	Formations in Arrestment Interval	Formations in Injection Interval
Dundee Limestone	Black River Glenwood, Trempealeau	Franconia, Eau Claire, Mt. Simon
Base of Lowermost USDW, ft	Depth to top of Arrestment Interval, ft	Injection Interval Top, ft
387	3467	4045

TOOL INFORMATION

Tool Zero	BDET, ft below tool ze	Ejector, ft below tool z	TDET, ft below tool zero	MDET, ft below tool zero	
0.0	0.0		-8.50	NA	

CALIBRATION INFORMATION

Depth BDET, ft	Depth TDET, ft	BDET CPSPI	Lithology	Maximum Reading, LD	Minimum Reading, LD
3955	3947	40	Hot (shale)	1.7	0.3
Depth BDET, ft	Depth TDET, ft	BDET CPSPI	Lithology	Maximum Reading, LD	Minimum Reading, LD
3802	3794	40	Cool (sandstone)	0.4	0

BACKGROUND LOG (BDET) BEFORE TESTS

Appearance of Log, lithology discernible, extremely suppressed, noisy, etc. Is calibration the same as for statistical checks?

Lithology is discernible on the log.

Version of 4/8/13

REVIEW OF RADIOACTIVE TRACER SURVEY FOR CEMENT INTEGRITY

Facility Name			Operator		
Romulus Facility			Environmental GeoTechnologies		
Well Name			USEPA Permit Number	Witness	Analyst
Well 1-12			MI-163-1W-C010	USEPA	Greenhagen
State	Test Date	Test Number	Logging Company		Analysis Date
Michigan	June 26, 2013	2013-038	Baker Hughes		July 30, 2013

FIRST SLUG TRACKING SEQUENCE

Flow Rate, gpm	Velocity in tubing, fpm	Depth of deflection on 1st pass	Deflection on 1st pass, I	Deflection/Background	Passes Through Slug
22	34	3149	65.5	38	9
Slug Split? yes or no	Depth of Split, ft	Moved up, yes or no	Minimum Slug Depth, ft		Maximum Slug Depth, ft
No	NA	NA	NA		4140

Comments

There does not appear to be any cause for concern with the slug tracking sequence.

FIRST STATIONARY TEST

Tool Setting Depth, ft	Depth of BDET, ft	BDET to open interval, ft	Time at station, min	Injection Rate, gpm	Log Divisions per Minute
4080	4080.0	0.0	30.5	22	12
Ejector Depth, ft	Depth of TDET, ft	BDET above deeper of tbg or casing, ft	Pass BDET up, LD	Pass UDET up, LD	Velocity Up, fl/min
	4071.5	Zero	179.3	NA	NA

Comments:

A small amount of upward moving radioactivity is detected in the bottom detector at 14.94 minutes into the test; however, there is no noticeable increase in activity detected in the top detector after this time. This indicates that the upward moving fluid remained below 4071.5 ft, which is well below the packer. This indicates that the increased activity in the bottom detector was likely fluid located inside the casing due to an eddy near the bottom of the long string casing.

FINAL LOG

Is the appearance much the same as the first log?

Yes

Do the traces overlay well above the casing shoe?

Yes

At what depths above the casing shoe does the final log show higher gamma ray activity?

NA

COMMENTS

There does not appear to be any cause for concern with the bottom casing cement at this well. See comments above on the stationary test analysis.

REGULATORY AND ENFORCEMENT REQUIREMENTS

Is there movement above the casing shoe?	Is there movement above the top of the injection interva	Is there cause for concern?
NO	**NO**	**NO**

HAVE REGULATORY OR ENFORCEMENT REQUIREMENTS BEEN MET?

YES

What follow-up actions have been taken?

What follow-up actions are needed?

Date follow-up action completed

Version of 4/8/13

REVIEW OF RADIOACTIVE TRACER SURVEY FOR CEMENT INTEGRITY

Facility Name			Operator		
Romulus Facility			Environmental GeoTechnologies		
Well Name			USEPA Permit Number	Witness	Analyst
Well #2-12			MI-163-1W-C011	USEPA	Greenhagen
State	Test Date	Test Number	Logging Company		Analysis Date
Michigan	June 27, 2013	2013-040	Baker Hughes		August 14, 2013

Well and Operational Information

LS Csg Material	LS Casing OD, in	Casing weight, #/ft	Casing ID, in	Long String Casing Length, ft	
Steel and Hastelloy	7	26		3983	
Tubing Material	Tubing OD, in		Tubing ID, in	Tubing Length, ft	
Fiberglass	4.5		3.980	3953	
Tail Pipe Material	Tail Pipe OD, in	Tail Pipe, weight#/ft.	Tail Pipe ID, in	Tail Pipe Length, ft	Tail Pipe Depth, ft
NA	NA	NA	NA	NA	NA
	OpenHole diameter, in	TD, ft	PBTD, ft	Top of Open Interval, ft	
	8.75	4550	4025	3983	
Packer Model		Packer Type		Top of Packer, ft	Bottom of Packer, ft
GPS				3953	3958

Geological Information

Name of Lowermost USDW	Formations in Arrestment Interval	Formations in Injection Interval
Dundee Limestone	Black River Glenwood, Trempealeau	Franconia, Eau Claire, Mt. Simon
Base of Lowermost USDW, ft	Depth to top of Arrestment Interval, ft	Injection Interval Top, ft
387	3382	3950

TOOL INFORMATION

Tool Zero	BDET, ft below tool ze	Ejector, ft below tool z	TDET, ft below tool zero	MDET, ft below tool zero	
0.0	0.0		-8.50	NA	

CALIBRATION INFORMATION

Depth BDET, ft	Depth TDET, ft	BDET CPSPI	Lithology	Maximum Reading, LD	Minimum Reading, LD
3855	3847	40	Hot (shale)	2.3	0.6
Depth BDET, ft	Depth TDET, ft	BDET CPSPI	Lithology	Maximum Reading, LD	Minimum Reading, LD
3800	3792	40	Cool (sandstone)	0.9	0

BACKGROUND LOG (BDET) BEFORE TESTS

Appearance of Log, lithology discernible, extremely suppressed, noisy, etc. Is calibration the same as for statistical checks?

Lithology is discernible on the log.

Version of 4/8/13

REVIEW OF RADIOACTIVE TRACER SURVEY FOR CEMENT INTEGRITY

Facility Name			Operator		
Romulus Facility			Environmental GeoTechnologies		
Well Name			USEPA Permit Number	Witness	Analyst
Well #2-12			MI-163-1W-C011	USEPA	Greenhagen
State	Test Date	Test Number	Logging Company		Analysis Date
Michigan	June 27, 2013	2013-040	Baker Hughes		August 14, 2013

FIRST SLUG TRACKING SEQUENCE

Flow Rate, gpm	Velocity in tubing, fpm	Depth of deflection on 1st pass	Deflection on 1st pass, ft	Deflection/Background	Passes Through Slug
36	56	3793	104.9	45	6
Slug Split? yes or no	Depth of Split, ft	Moved up, yes or no	Minimum Slug Depth, ft		Maximum Slug Depth, ft
No	NA	NA	NA		4052

Comments

There does not appear to be any cause for concern with the slug tracking sequence.

FIRST STATIONARY TEST

Tool Setting Depth, ft	Depth of BDET, ft	BDET to open interval, ft	Time at station, min	Injection Rate, gpm	Log Divisions per Minute
3980	3980.0	3.0	31.8	36	12
Ejector Depth, ft	Depth of TDET, ft	BDET above deeper of tbg or casing, ft	Pass BDET up, LD	Pass UDET up, LD	Velocity Up, ft/min
	3971.5	3	NA	NA	NA

Comments:

There does not appear to be any cause for concern with the stationary test.

FINAL LOG

Is the appearance much the same as the first log?

Yes

Do the traces overlay well above the casing shoe?

Yes, except between 3375-3840 feet in the bottom detector.

At what depths above the casing shoe does the final log show higher gamma ray activity?

Between 3375-3840 feet in the bottom detector.

COMMENTS

A large portion of the final gamma ray log bottom detector appear elevated compared to the run before the test (see notes above). Due to this being only in one detector, it is unknown what would cause this tool response; however, it is not likely that it is the result of a problem with the cement at the base of the long string casing. This area should be more closely reviewed during next year's tracer survey. There does not appear to be any cause for concern with the bottom casing cement at this well.

REGULATORY AND ENFORCEMENT REQUIREMENTS

Is there movement above the casing shoe?	Is there movement above the top of the injection interval	Is there cause for concern?
NO	**NO**	**NO**

HAVE REGULATORY OR ENFORCEMENT REQUIREMENTS BEEN MET?

YES

What follow-up actions have been taken?

What follow-up actions are needed?

Date follow-up action completed